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10/574,187

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EXAMINER

VINH, LAN

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/574,187 | Applicant(s) COOKE ET AL. | |
| | Examiner LAN VINH | Art Unit 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16, 18-25, 27-37, 39 and 40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16, 18-25, 27-37, 39 is/are rejected.
- 7) ☒ Claim(s) 15 and 40 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 8-11, filed 7/20/2009, with respect to the rejection(s) of claim(s) 1-8, 13, 15-19, 23-24 under 35 U.S.C 102(b) as being anticipated by Choquette/ the rejection(s) of claims 1-2, 18, 21-22 under 35 U.S.C 102(e) as being anticipated by Johson (069) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration and search, a new ground(s) of rejection is made in view of the newly cited reference of Johson (US 6,511,577)

The new ground of rejection(s) follows

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-3, 4-8, 13, 16, 18-24 rejected under 35 U.S.C. 102(a) as being anticipated by Johnson (US 6,511,577)

Johnson discloses a plasma chamber comprising : a chamber; a gas flow system configured to cause a flow of at least one gas within said chamber and to remove said gas from said chamber (col 6, lines 40-55), a plasma generator for causing the at least one gas within the chamber to form a plasma, said plasma generator comprising an

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induction coupled plasma source having an RF coil 38 encircling said chamber, thereby generating at least one species said plasma being generated in a plasma generation region (region between plate 42 and wafer 32) extending between a wall of said chamber which is proximal to said RF coil, and a first width which is distal from said RF coil (col 6, lines 1-7; fig. 5), a conical structure/frustum/guide located below plate 42 for directing the gas flow containing the species towards said substrate to be treated, said guide defining a path through which said at least one gas and said at least one species flow from said plasma generating region to said substrate; the guide having an entrance (opening adjacent to plate 42) and an exit (opening above the wafer 32), the entrance having a second width and being disposed proximal to said plasma generating region, said exit having a third width and being disposed proximal to said substrate to be treated; said second width being greater than said first width, and said third width is less than said first width, said guide being configured such that at least one gas is directed toward said substrate to be treated (col 7, lines 35-57; fig. 5)

It is noted that claims 1, 2, 8, 13, 24, drawn to an apparatus and the recitations of "is adapted to direct towards the substrate at least the species generated substantially at or adjacent the periphery of the plasma", "to prevent line of sight between said substrate to be treated and said plasma generating region so as to shield the substrate from electromagnetic radiation originating from the plasma" and "is configured to prevent the quenching of active species within the gas flow", "arranged to recompress the plasma as it flows substantially radially in a region adjacent the edge of the substrate" are considered as intended use/functional claim language. It has been held that claims

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directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844,847, 120 USPQ 528,531 (CCPA 1959).

Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

Regarding claim 3, Johnson discloses that the chamber comprises a gas-deliver component for supplying gas into the chamber/inlet and a inject plate 42/deflector device within the chamber for directing the introduced into the chamber towards most active region of the plasma (fig. 5)

Regarding claims 4-6, Johnson discloses that the top opening of guide is substantially curved in section/the guide is substantially linear in section/the guide is substantially a hollow conical frustum (fig. 5)

Regarding claims 7-8, 16, 21, fig. 5 of Johnson shows that the guide is formed from the chamber wall, mounted to a support 30 and provided with asymmetrical walls between said entrance and exit and wherein said center of said guide is disposed asymmetrically with respect to the wafer 32/substrate, resulting in a bulk flow of said at least one species across the substrate, the substrate is shielded by the guide (col 7, lines 50-60; fig. 5)

Regarding claims 18-19, 20, Johnson discloses that the chamber comprises a movable support 30 for support the substrate (col 7, lines 54-58)

Regarding claim 23, Johnson discloses that the guide is arranged to have has an

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external dimension just less than that of the chamber such that, during use the guide undergoes thermal expansion and comes into thermal contact with the chamber (fig. 5)

Regarding claim 24, Johnson discloses that the guide comprises an underside surface (fig. 5)

3. Claims 25, 27-28, 30, 33-34, 35-37 are rejected under 35 U.S.C. 102(a) as being anticipated by Johnson (US 6,511,577)

Johnson discloses a plasma processing comprises: causing one gas to flow within a chamber; forming a plasma from the at least one gas within the chamber using a plasma generator said plasma generator comprising an induction coupled plasma source having an RF coil 38 encircling said chamber thereby generating ions/ one species (col 7, lines 50-60; fig. 5), directing the gas flow containing the species towards the substrate with a conical structure/a guide having a opening proximate to said plasma generating region having a diameter greater than that of an opposing opening proximate to the wafer 32/ substrate ; wherein the width of the plasma in use is greater than that of the substrate, the difference between the widths defining an outer region of plasma proximal to a wall of said chamber encircled by said RF coil, and wherein the ions/species are directed toward the wafer /substrate 32 (col 7, lines 53-57; fig. 5), providing RF power to the chamber (col 8, lines 45-49), flowing nitrogen gas into the chamber (col 7, lines 60-63)

The limitations of claims 27-28, 30 have been discussed above

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Regarding claims 33-34, Johnson discloses performing etching (col 7, lines 55-57)

Regarding claims 35-37, fig. 5 of Johnson shows that the plasma ions/species generated substantially at or adjacent the periphery of the plasma are guided onto the substrate by the guide, the gas is directed into the chamber towards the most active region/ causing a flow of the ions/species across the wafer 32/substrate (col 7, lines 53-57)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-12, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 6,511,577) in view of Hatanaka et al(US 5962083)

Johnson chamber has been described above. Unlike the instant claimed inventions as per claims 9-12, Johnson fails to disclose an electrically conducting mesh/a magnet/plasma termination device disposed between said plasma generating region and said substrate so as to attenuate the supply of electrically charged species to the substrate, the grid mesh mounted to the guide and through which the gas flow passes when travelling between the entrance opening and exit opening of the guide.

Hatanaka discloses a plasma CVD apparatus comprises a electrically conducting mesh 14 disposed between a plasma generating region and a substrate 7 and a magnet

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2 (col 4, lines 1-20; fig. 1)

One skilled in the art at the time the invention was made would have found it obvious to modify Johnson plasma apparatus to include an electrically conducting mesh/plasma termination device mounted to the guide disposed between the plasma generating region and the substrate to control the electrons, negative and positive ions in the plasma as taught by Hatanaka (col 4, lines 30-35) thus achieving uniform etching/depositing processes

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 6,511,577) in view of Ni et al (US 6,257,168)

Johnson apparatus has been described above. Unlike the instant claimed invention as per claim 14, Johnson fails to disclose a guide heating system arranged to heat the guide to a predetermined temperature

Ni discloses a plasma apparatus comprises a heating system arranged to heat the guide 402 (col 10, lines 46-47)

One skilled in the art at the time the invention was made would have found it obvious to modify Johnson apparatus to include an heating system arranged to heat the guide to reduce the amount of polymer build up on the surface of the ring as taught by Ni (col 10, lines 45-50)

6. Claims 29, 31, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 6,511,577) in view of Demmin et al (US 6,635,185)

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Johnson (577) method has been described above. Unlike the instant claimed invention as per claims 29, 31, 32, Johnson fails to disclose the specific values of the chamber pressure, power, and gas flow rate

Demmin, in a method of etching, discloses that chamber pressure, power and etching composition flow rate are plasma etching operating conditions that can have an effect on the results obtained (col 7, lines 15-20)

One skilled in the art at the time the invention was made would have found it obvious to vary the chamber pressure and gas flow rate in Johnson method by conducting routine experimentations in order to optimize these value in view of Demmin teaching since Demmin discloses that one skilled in the art can vary these parameters accordingly to etch a desired material satisfactorily (col 7, lines 20-25)

Allowable Subject Matter

7. Claims 15, 40 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 15, the prior art of record fails to disclose or suggest an apparatus for plasma treating a substrate comprises a limitation of wherein the guide is detachable, in combinations with the rest of the limitations of claim 15

Regarding claim 40, the prior art of record fails to disclose or suggest a method for plasma treating a substrate comprises a limitation of wherein said most active region

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of said plasma is said outer region, wherein said outer region encloses an inner region, and wherein more of said at least one gas entering the chamber is directed to said outer region rather than said inner region, in combinations with the rest of the limitations of claim 40

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is (571)272-1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Lan Vinh/
Primary Examiner, Art Unit 1792